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Antioxidant and Antimicrobial Activities of Essential Oil of Lemon (*Citrus limon*) Peel *in Vitro* and in a Food Model

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HIGHLIGHTS

- The total phenol content was 81.82±8.02 mg gallic acid equivalent/g of lemon peel EO.
- The total amount of flavonoids in the lemon peel EO was 11.72±1.82 mg/g rutin equivalent.
- The MIC and MBC value of lemon peel EO against *Staphylococcus aureus* was 1.25 and 5%.
- Lemon peel EO showed considerable antioxidant and antimicrobial properties both *in vitro* and in food model.

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Acronyms and abbreviations
EO=Essential Oil
MIC=Minimum Inhibitory Concentration
MBC=Minimum Bactericidal Concentration
DPPH=2, 2-diphenyl-1-picrylhydrazyl
CFU=Colony Forming Unit

ABSTRACT

Background: Citrus fruits have some antioxidant and antimicrobial properties. The aim of this study was to determine the chemical compounds, antioxidant, and antimicrobial activities of Essential Oil (EO) of lemon (*Citrus limon*) peel *in vitro* and in a food model.

Methods: The analysis of the lemon peel EO was carried out using gas chromatography-mass spectrometry. Total phenolic and flavonoid content was determined using standard protocols. The antioxidant activity of the EO was also evaluated using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay. Antimicrobial properties of the EO were assessed against *Staphylococcus aureus* using the broth microdilution method. Also, barely soup was chosen as food model. Data were analyzed using SPSS Inc. software version 22.0.

Results: The total phenol content was 81.82±8.02 mg gallic acid equivalent/g of the EO. Also, the total amount of flavonoids in the EO of lemon peel was 11.72±1.82 mg/g rutin equivalent. Lemon peel EO showed 55.09% inhibition of DPPH, showing significant difference with control group (p<0.05). The MIC and MBC value of EO against *S. aureus* was 1.25 and 5%, respectively having significant difference (p<0.05) with control group. A dose-dependent manner was seen in food model revealed significantly lower (p<0.05) bacterial number in EO containing barley soup groups than the control one.

Conclusion: The EO of lemon peel showed considerable antioxidant and antimicrobial properties both *in vitro* and barley soup as food model.